

Public Health Seattle & King County

OSS Work Group

Onsite Sewage System Basics
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Today's Topics:

- What is an onsite sewage system (OSS); what does it do
 - Basic characteristics – a living system
 - System types
 - Performance factors
 - Design life estimates
- OSS proper operation and maintenance
 - Physical protection
 - Secure access
 - Influent limitations
 - Monitoring
 - Maintenance

Definitions

- Septic: of or relating to, or causing putrefaction
- Putrefaction: the decomposition of organic matter; especially : the typically anaerobic splitting of proteins by bacteria and fungi with the formation of foul-smelling incompletely oxidized products
- Aerobic: metabolism by an organism (as a bacterium) that lives only in the presence of oxygen
- CBOD: a measure of the oxygen needed to decompose organic matter in sewage
- Fecal coliform: a type of bacteria common to the human gut used as a contamination measure
- FOG: fats, oil, and grease
- Suspended solids: colloidal particles in the liquid portion of sewage or treated effluent
- Primary Treatment: settling of heavy solids, floatation of FOG, and containment of suspended solids
- Intermediate Treatment: clarification, filtration, disinfection or other treatment prior to dissipation
- Distribution: transfer between treatment devices or to a dissipation device prior to in-soil disposal
- Dissipation: movement of treated effluent over an infiltrative surface for in-soil disposal
- PPCPs: pharmaceuticals and personal care products

How We Got Here: A Concise History

The Bible: Deuteronomy 23: 9-14

Open defecation practice

The privy for privacy

Germ theory of disease – 1800's

Establishment of local public health agencies – 1920-1940

US Public Health Service restructure – 1944

Manual of Septic Tank Practice – 1957

Development and use of aerobic treatment devices – 1950's

Advanced onsite sewage system technologies – 1970-present

Primitive System - Open defecation



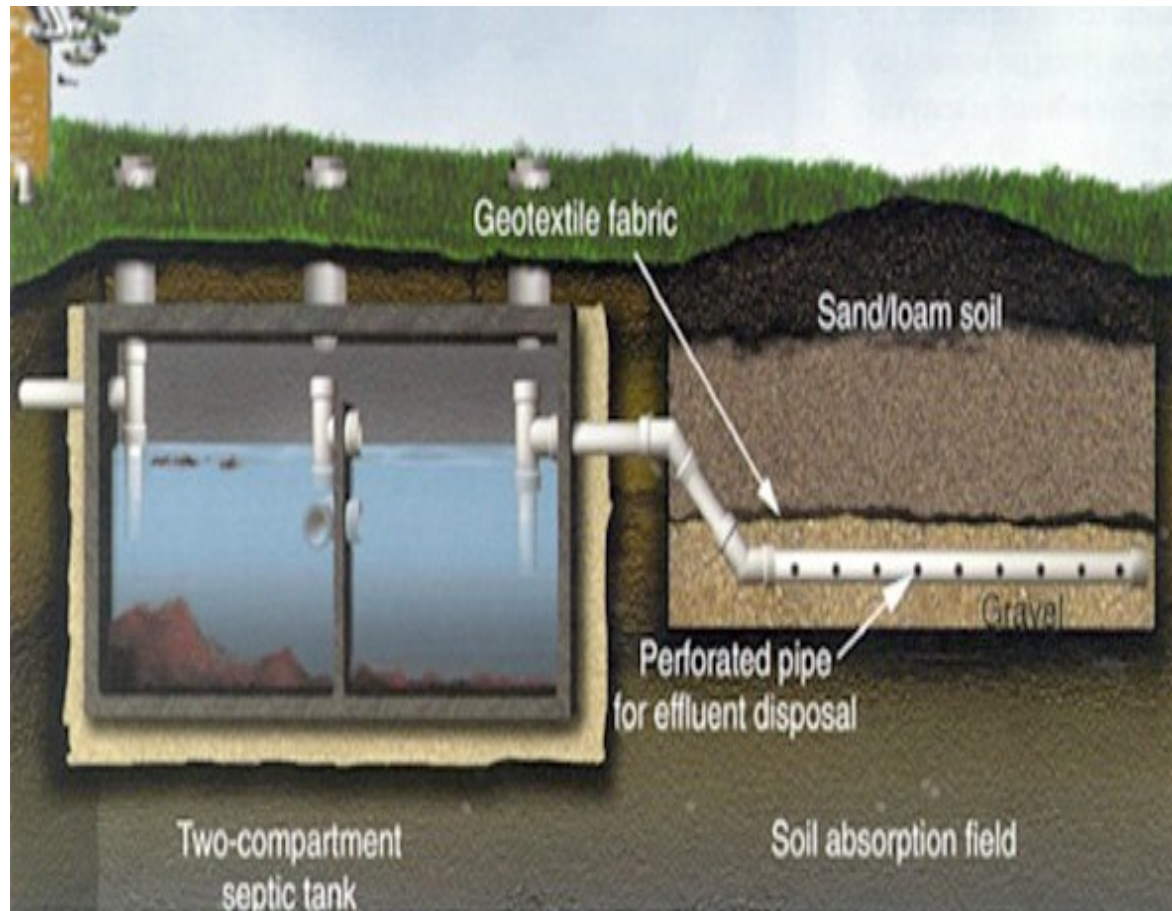
Roman Public Toilet



The Privy for Privacy



Septic Tank and Drainfield



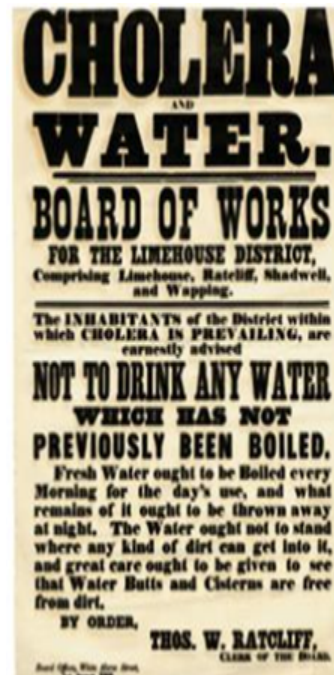
A More Sophisticated System



OSS Health Impacts

The germ theory of disease – 1500-1880

John Snow's pump, Louis Pasteur,
Robert Koch



The Broad Street Pump, London, 1854

Other Potential OSS Pollution Impacts

- Typhoid fever
- Polio
- Gastrointestinal illness - viral
- Shellfish contamination – fecal coliform
- Shellfish growth/death potentiation
- Reproductive changes in fish
- Marine oxygen depletion

Current Onsite Sewage System Devices

Privy

Composting and incinerator toilets

Cesspool

Seepage pit

Septic tank

Aerobic treatment unit (ATU): fixed or suspended media

Membrane bioreactor (MBR)

Sequencing batch reactor (SBR)

Filters: sand, gravel, upflow, recirculating

Disinfection devices: chlorinator, UV disinfectors

Dissipation devices: gravel trench, gravelless chambers,
mound, bioswale (lagoon), irrigation dripline

Sewage Treatment Processes

- Settling
- Anaerobic decomposition
- Clarification
- Filtration
- Aerobic decomposition
- Nitrogen removal
- Effluent dissipation

Onsite Sewage System Performance

WAC 246-272A Required Treatment Levels for Proprietary Devices

TN (mg/L)	Treatment	CBOD ₅	TSS	O&G	FC
	Level	(mg/L)	(mg/L)	(mg/L)	(#/100 ml)
A	10	10	----	200	----
B	15	15	----	1,000	----
C	25	30	----	50,000	----
D	25	30	----	----	----
E	125	80	20	----	----
N	----	----	----	----	20

Note: Designers must match the distribution method (gravity, pressure, or pressure with timed dosing) to the certified treatment capability of the chosen treatment product and the soil character (texture and depth to limiting layer or ground water).

System Life Estimates

- Historic rule of thumb: 20 years for septic tank/gravity leach field
- Dependence upon site conditions, design, installation, operation and maintenance
- Vashon/Maury Island survey: up to 75 years
- WA DOH 2013 study: 1 – 2% annual failure=50 to 100 years
- Other data: 1 – 75% failure rates
- Theoretical life: permanent with proper maintenance

Operation and Maintenance Factors

- **Physical protection:** isolate; avoid vehicular or large animal traffic
- **Secure, easy access:** bolt-down lids at grade, locked panels, electrical protection
- **Influent limitations:** limit solids, FOG, toxic chemicals, pharmaceuticals
- **Monitoring:** regular, periodic checks by trained owner or professional
- **Maintenance:** as needed to prevent major problems

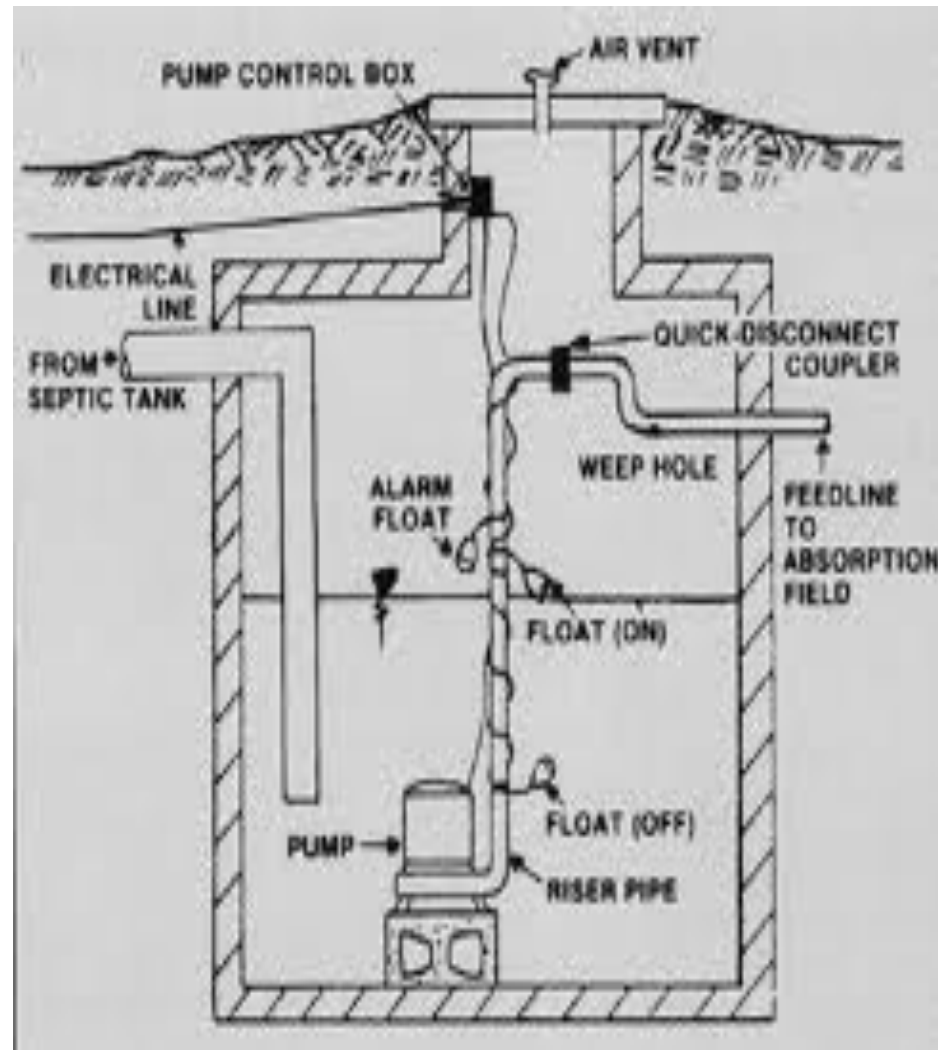
Why Do Maintenance?



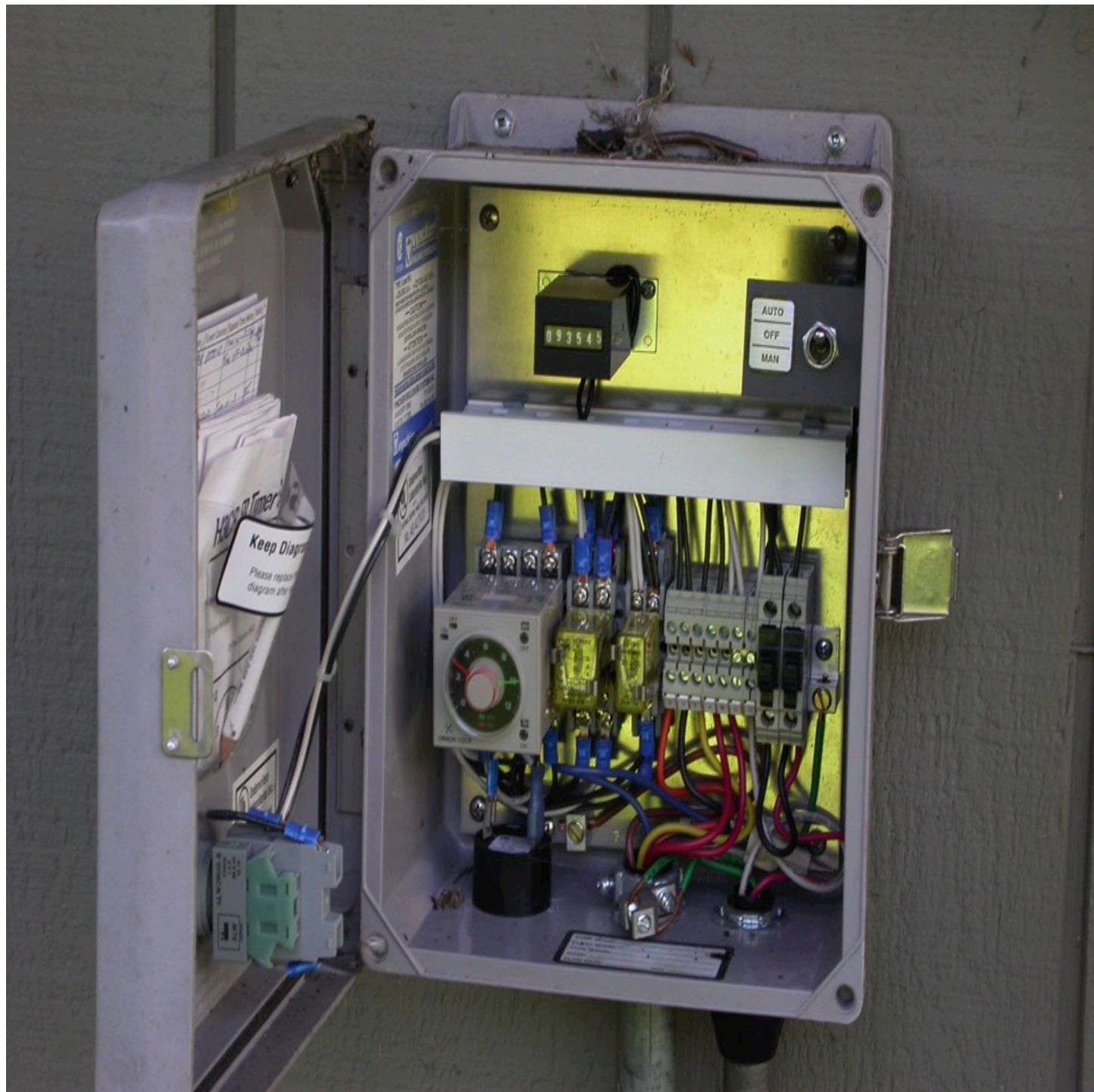
Effluent Filter



Typical Pump Chamber











Questions?

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